Commercial Space Transportation Advisory Committee (COMSTAC)
Systems Working Group Teleconference Minutes
November 13, 2012, 1:00-2:00 pm EDT

I. Introduction

a. COMSTAC DFO, Paul Eckert, opened the human space flight public input call. He reminded participants the call is recorded, and to identify themselves before making a comment. Also, participants should e-mail a confirmation that they attended.
b. Pam Melroy, FAA, took over the call. She recognized Livingston Holder as Chair of the COMSTAC working group hosting the call. She also noted this was the fourth in a series of telecons on human space flight regulations, with two more scheduled. The agency is not soliciting proposals, only doing background research. She reiterated the call is being recorded, so speakers should identify themselves, and minutes of the meeting will be published. The charts for the telecon are also published on the website. The next call is scheduled for December 18th at 1 p.m.

II. Presentation

a. Background
    i. Pam Melroy summarized the last telecon, where the discussion was what types of requirements and associated guidance material the FAA should develop. One topic discussed repeatedly was the concept of definitions.

b. Today's Topic: Key Terms and Definitions for Commercial Human Space Flight Safety
    i. Pam Melroy introduced Dr. David Klaus from the University of Colorado, who leads a task for the Center of Excellence for Commercial Space Transportation.
    ii. David Klaus thanked Pam and discussed his task with the Center of Excellence. Their focus is on human rating, and they decided to look at terms and definitions associated with that. The goal for the telecon is to get some perspective from industry and other participants, specifically on terms and definitions that pertain to safe return to Earth.
        1. He also said they want to look at what it means to have an ambiguous term, and getting to the point of different stakeholders agreeing on a straightforward definition.
    iii. Livingston Holder, Chair, added that people define terms based on their particular experience, and going forward, possibly to future regulations, it is important as industry to agree on definitions in their industry environment.
    iv. Randy Raley asked about access to David Klaus' document of terms. Dave responded that it is towards the end of the slide set, but he will add Randy to the distribution list. Dave also recognized the work of Christine Fanchiang, PhD student, in putting the document together.

c. Four Stakeholders
    i. David Klaus identified four stakeholders in determining industry definitions: regulators, operators, customers, and insurers. He asked if anyone had ideas for a missing category of stakeholders.
        1. Someone suggested training, since that involves the untrained public both as participants, and as flight, pilots and crew. David Klaus asked if that would be considered as part of Operators. The original speaker said it was a completely different area.
        2. Derek Webber said manufacturers and operators are not necessarily the same.
        3. Greg Kennedy seconded the comment about training.
        4. Erika Wagner said one distinction is between who funds a flight versus who takes a flight, particularly in research. The funding agency may be different then the researchers or university flying.
        5. Tom Weiner expanded on that comment, suggesting a section for researchers or scientific consultants. Past telecons have discussed medical or scientific radiation issues, all in the realm of research, with effects for other stakeholders. Someone seconded the comment.
        6. David Klaus reiterated that the emphasis is on regulatory implications. It is important to be able to define the boundaries for regulatory requirements. Operators and training and manufacturing need to know the requirements to design and operate to. Customers, funding agency, researches, purchasers, will have certain expectations. Insurers are about what clauses take affect and when for the parties involved.
        7. Randy Raley mentioned the possibility of dealing with a third-party certification organization, including for training.
        8. Derek Webber added the need to address the word "international" under regulators, since one implication is how to talk to the rest of the world.

d. Implications of Ambiguous Definitions
    i. David Klaus described this as the implications of having ambiguous definitions for important terms. One implication across all categories is early termination of flight.
        1. He compared it back to landing a Cessna on the highway. It's okay if it's an emergency. But not because someone forgot their lunch. Specific regulations for different scenarios can obviously be affected by the definition.
        2. He offered other implications, like for people funding and meeting obligations, have contractual obligations been fulfilled?
        3. Have passenger expectations been fulfilled? He compared it to flying to D.C., and landing in Dulles instead of Reagan.
        4. When might an insurance claim be warranted?

ii. David Klaus asked the question, "When is an abort an abort?"
    1. Someone asked if this is some sort of earned value management system. Dave responded that it is probably along those lines, but the focus is on regulatory issues.
    2. The original speaker asked as a hypothetical, did a participant accomplish what they needed to even if they didn't get the full amount of time contracted for? David Klaus agreed, suggesting someone who completed research objectives but the flight duration was shorter than planned.
    3. Rachel Yates asked whether third party damage to the public is handled in this context. David Klaus agreed that it is an important aspect of FAA regulation, and ought to be included, but maybe not as a stakeholder.
    4. Pam Melroy stated that public safety is the mission at the FAA, but the call is focused on occupant safety.

iii. Earliest Return Alternatives
    1. David Klaus directed attention to Slide 11, which illustrates various earliest return alternatives, including abort to orbit. He asked whether that counts as an abort. He discussed multiple abort scenarios, including abort from orbit. He asked the participants whether there were other alternatives for early return back to earth.
    2. Jon Turnipseed mentioned that the definition of ascent used was a standard NASA definition for heavy-lift boosters. This does not match the definition for hybrid launch vehicles, where ascent starts when they actually fire the rocket motor.
    3. George Tyson noted this might be a difference between an off-nominal flight and an abort. David Klaus seconded that comment, suggesting an abort to orbit might be off-nominal as opposed to a true abort.
    4. Someone disagreed, noting that an abort to orbit is usually not stable enough to be maintained. David Klaus took note, categorizing it as an early return or abort from non-stable orbit. He asked Pam Melroy if the shuttle completed a mission after an abort to orbit. She confirmed that it had been done on STS-51F.
    5. The original speaker suggested that abort means abandoning the original flight plan without possibility of returning to it. Off-nominal would mean a deviation with return to the original plan.

iv. Define Abort Terminology
    1. David Klaus directed attention to Slides 12 and 13, which have definitions from different sources, primarily NASA and FAA, but also the general dictionary. He asked the participants whether any terms associated with abort jumped out at them.
    2. Derek Webber mentioned, in regards to stakeholders, that air traffic control should be using the same definitions for these terms,

and should be a stakeholder. David Klaus accepted the idea, and suggested it could go under operators.

3. Jon Turnipseed added the term spaceflight participants alongside crew. David Klaus seconded the comment, suggesting that the rest of the FAA does not usually have that distinction.
4. Greg Kennedy stated that the current example definition of abort does not accommodate completing a mission at a lower than planned orbit. David Klaus responded that yes, a completed mission is not a forced early return necessarily, but may still be an early termination.
5. Alex Saltman asked if an abort definition without impact on the safety of passengers, crew, or the public is useful to the FAA's limited regulatory authority.
6. Someone commented that for the term contingency, it may be difficult to identify every single contingency abort location. And along with the term emergency, they should be defined based on safety-critical system failures. They should be delineated on a chronology of events, from minor to very extreme.
7. David Klaus seconded the comment, contrasting the emergency of a heart-attack on board to a vehicle system failure. He also noted that there is a bibliography for the source of each definition listed in the slide.
8. Pam Melroy reminded participants that definitions are important from a regulatory standpoint, to determine situations under which a different set of safety criteria will apply.

v. Define Emergency Terminology

1. David Klaus directed attention to slide 15 for a variety of definitions for the term emergency.
2. Derek Webber seconded an earlier comment that it is important to consider how the spaceflight participant's health may be used as a reason for abort. David Klaus responded that in existing literature the term "hazard to the occupants" is used to be more generic. Dave asked whether that is an appropriate term.
3. Someone responded that it seems appropriate, but it may need to be edited specifically to "spaceflight participants" and "crew."
4. David Klaus continued to discuss emergency situations, comparing scenarios like crosswinds or extreme weather closures.
5. Someone asked whether medical standards should really be different from the spaceflight participant to the crew.
6. David Klaus responded that it may be a scenario where standards are more constraining for the flight crew.
7. Someone suggested an additional reference document for aggregating definitions, F1917-10, the range safety document, since the industry could be flying out of air force ranges. David Klaus responded that they have that document in the broader list.

8. Jon Turnipseed suggested adding a human factor to the definition of "all-mechanical." Randy Raley seconded the comment, mentioning the crew as part of the landing system. David Klaus agreed.

vi. Early Return Considerations
    1. David Klaus directed attention to Slide 20 regarding early return considerations and asked participants if they had thoughts.
    2. Someone asked if this also address flight extension considerations. David Klaus responded that it would have safety implications, due to radiation exposure and other potential risks.
    3. Someone else asked about requiring owners to carry extra provisions and air. David Klaus called it consumable margin, and commented it could have a regulatory consideration.

vii. Define Landing Site
    1. David Klaus directed attention to Slide 21. He identified three categories of landing sites, as defined by NASA: supported, prepared alternate, and unsupported.
    2. He also commented it depends on the type of vehicle and its design, either for a runway landing or a water landing. He also compares it to landing at Kennedy with a standby crew, or landing in Kazakhstan with a helicopter crew.
    3. Jon Turnipseed recommended removing the term CONUS, continental United States landing site, and making it an international term, to reflect the future of possible international landing sites.

e. End of Presentation
    i. David Klaus reminded participants these terms and definitions are part of a task to try and develop a more comprehensive database for the FAA to make informed decisions. This is part of the Center of Excellence for Commercial Space Transportation. He again recognized Christine Fanchiang, PhD, for her work. Their contact information is available on Slide 23 for anyone to participate in the working definitions.
    ii. The references used for the definitions in the slides are only a third of the total reference documents they have collected. But they welcome suggestions.

III. Conclusion

a. Livingston Holder, Chair, thanked participants for calling in and contributing. He encouraged everyone to continue participating in these activities to give their input to the FAA on how to make worthwhile regulations. The worst thing would be to not inform the FAA before they make a regulation that ends up being avoidable.
b. Pam Melroy thanked Livingston Holder and the Systems Working Group of COMSTAC for hosting the telecon. And Dr. David Klaus for leading the conversation.
c. She informed participants that the December 18th telecon will discuss abort systems, in regards to questions like fault tolerance, launch and ascent, phases of flight, and vehicle type.

Teleconference Participants

Livingston Holder, Chair, David Allen (Black Sky Training), Sirisha Bandla (Commercial Spaceflight Federation), Jeff Bingham (Senate Space Subcommittee), Alex Burkett (House Transportation and Infrastructure), Chris Burns (Cutting Edge Communications), Casey Deitrich (CQ Transcriptions), Adam Dershowitz (Exponent), Bailey Edwards (Senate Aviation Subcommittee), Christine Fanchiang (Colorado), Ed Feddeman (House Science), Rob Frize (Carrick Consulting), Giles Giovinazzi (House Transportation and Infrastructure), John Horner (Marsh, Inc.), Angelo Karavolos (NTB Technologies and Associates), Greg Kennedy (NASTAR Center), David Klaus (Colorado), Marshall Lammers (Zuckert Scoutt & Rasenberger, LLP), Dan Leone (Space News), Allen Li (House Science), Michael Lopez-Alegria (Commercial Spaceflight Federation), Mike Matousek (House Transportation and Infrastructure), Vincent Michaud (NASA Headquarters), Robert Millman (Blue Origin), Ken Monroe (House Science), Brad Owen (United States Aircraft Insurance Group), Simone Perez (House Transportation and Infrastructure), Andrew Rademaker (House Transportation and Infrastructure), Randy Raley (Sunshine Aerospace), Alex Saltman (Commercial Spaceflight Federation), Christine Smith (wyle), Milton Smith (Sherman & Howard LLC), Rich Swayze (Senate Aviation Subcommittee), Jessica Sypniewski (Senate Aviation Subcommittee), Jon Turnipseed (Virgin Galactic), George Tyson (Orbital Commerce Project), Erika Wagner (Blue Origin), Derek Webber (Spaceport Associates), Pamela Whitney (House Science), Thomas Wiener (Thomas C. Wiener, MD), Holly Woodruff (House Transportation and Infrastructure), Rachel Yates (Holland & Hart LLP), Ann Zulkosky (Senate Space Subcommittee)

Participants from the FAA Office of Commercial Space Transportation (AST) included: Paul Eckert, David Gerlach, Stewart Jackson, Henry Lampazzi, Brian Meade, Pamela Melroy, Randy Repcheck, Rene Rey, Ken Wong